CLAIMS

What is claimed is:

1. A capacitive sensor comprising:

a body;

a pendulum suspended from the body;

at least one capacitor, wherein each capacitor has a first electrode on the body and a second electrode on the pendulum, whereby a variable capacitance between the first electrode and second electrode is indicative of a relative angular position between the body and the pendulum.

2. The capacitive sensor of claim 1, wherein the second electrode of a plurality of the capacitors is a conductive surface of the pendulum.

3. The capacitive sensor of claim 1 there being a plurality of the capacitors and, further comprising electronic circuitry coupled to the capacitors which determines a capacitance relationship of the capacitors.

4. The capacitive sensor of claim 3, wherein the capacitance relationship relates a capacitance of a first of the capacitors with a capacitance of a second of the capacitors.

5. The capacitive sensor of claim 3, wherein the capacitance relationship relates a capacitance of a first of the capacitors in a tilted position of the body with a capacitance of the first of the capacitors in a reference position of the body.

6. The capacitive sensor of claim 5, wherein the reference position is a position orthogonal to the Earth's gravitational pull.

7. The capacitive sensor of claim 1, further comprising circuitry coupled to the capacitor and which generates a signal indicative of a direction of tilt of the body from the pendulum.

8. The capacitive sensor of claim 1, further comprising circuitry coupled to the capacitor and which generates a signal indicative of a degree of tilt between the body and the pendulum.

9. The capacitive sensor of claim 1, wherein:

there are at least four of the capacitors and the electrodes of the first capacitor are positioned on an opposing side of the pendulum from the electrodes of the second capacitor, and distances between the electrodes of each of the first and second capacitors change with movement of the pendulum in a first vertical plane; and

the electrodes of the third capacitor are positioned on an opposing side of the pendulum from the electrodes of the fourth capacitor, and distances between the electrodes of each of the third and fourth capacitors change with a movement of the pendulum in a second vertical plane.

10. The capacitive sensor of claim 1, wherein the pendulum comprises:

a mass; and

a spring coupling the mass to a pivot of the body.

11. The capacitive sensor of claim 1, there being a plurality of the capacitors and further comprising circuitry coupled to the capacitors and which determines a relationship between capacitances of the capacitors, wherein the relationship is indicative of an angle between an axis of the body and an axis of the pendulum.

12. The capacitive sensor of claim 1, further comprising circuitry coupled to the capacitor and which generates a signal indicative of the relative angular position between the body and the pendulum.

13. The capacitive sensor of claim 1, further comprising a reference surface associated with the body.

14. The capacitive sensor of claim 13, further comprising at least one actuator mechanically coupled to the reference surface or body thereby to orient the reference surface relative to a support surface.

15. The capacitive sensor of Claim 1 wherein the pendulum has a conductive area disposed at each of four quadrants; and the body includes:

a pivot;

a first conductive area facing the first quadrant of the pendulum;

a second conductive area facing the second quadrant of the pendulum;

a third conductive area facing the third quadrant of the pendulum; and

a fourth conductive area facing the fourth quadrant of the pendulum; the conductive areas on the pendulum and body respectively defining four capacitors; wherein the pendulum is suspended from the pivot.

16. A method to detect a tilt of a reference surface, comprising the acts of:

providing first and second capacitors each having capacitance varying with the tilt of the reference surface;

discharging the capacitors;

initiating a charging of the capacitors;

monitoring which of the capacitors reaches a predetermined voltage first; and

determining a direction of the tilt from the monitoring.

17. The method of claim 16, further comprising the act of generating a signal to rotate the reference surface in one direction if the first capacitor reached the predetermined voltage first, or in an opposite direction if the second capacitor reached the predetermined voltage first.

18. A method to determine a degree of difference between capacitances of two capacitors, the method comprising the acts of:

(a) discharging the capacitors;

(b) initiating a charging of the capacitors;

(c) monitoring whether the first capacitor reached a first voltage before the second capacitor reached a second voltage;

(d) decreasing the first voltage if the first capacitor reached the first voltage before the second capacitor reached the second voltage, or increasing the first voltage if the first capacitor reached the first voltage after the second capacitor reached the second voltage; and

(e) repeating (a) through (d) until the first capacitor reaches the first voltage at a time within a predetermined threshold as the second capacitor reaches the second voltage.

19. The method of claim 18, further comprising the acts of:

(f) calculating a voltage difference between the first and second voltages; and

(g) generating a signal indicative of the voltage difference which represents an angular measurement of the tilt.